TERMINAL LEARNING OBJECTIVE

ACTION: Correct power train system malfunctions.

CONDITIONS: In a classroom, and at a training site, given items of construction equipment and axle assemblies with power train system malfunctions with technical manuals (TMs) applicable to each item of equipment, TM 9-214, TM 9-8000, a general mechanic's tool kit, special tools, Test Measurement and Diagnostic Equipment (TMDE), standard shop equipment, a shop set #1 common, petroleum, oils, and lubricants (POL), parts, necessary maintenance forms, a pen, and a pencil.

STANDARDS: Perform the following in accordance with (IAW) TMs applicable to each item of equipment, without damage to equipment or the environment, and without injury to personnel:

1. Identify the fundamentals of power train systems.
2. Identify power shift transmission components, their functions, and test and adjustment points.
3. Perform power shift transmission troubleshooting, repair, and adjustments.
4. Identify differential and axle components, their functions, and adjustment points.
5. Perform differential and axle troubleshooting, repair, and adjustments.
6. Identify final drive components, their functions, and adjustment points.
7. Perform final drive troubleshooting, repair, and adjustment.

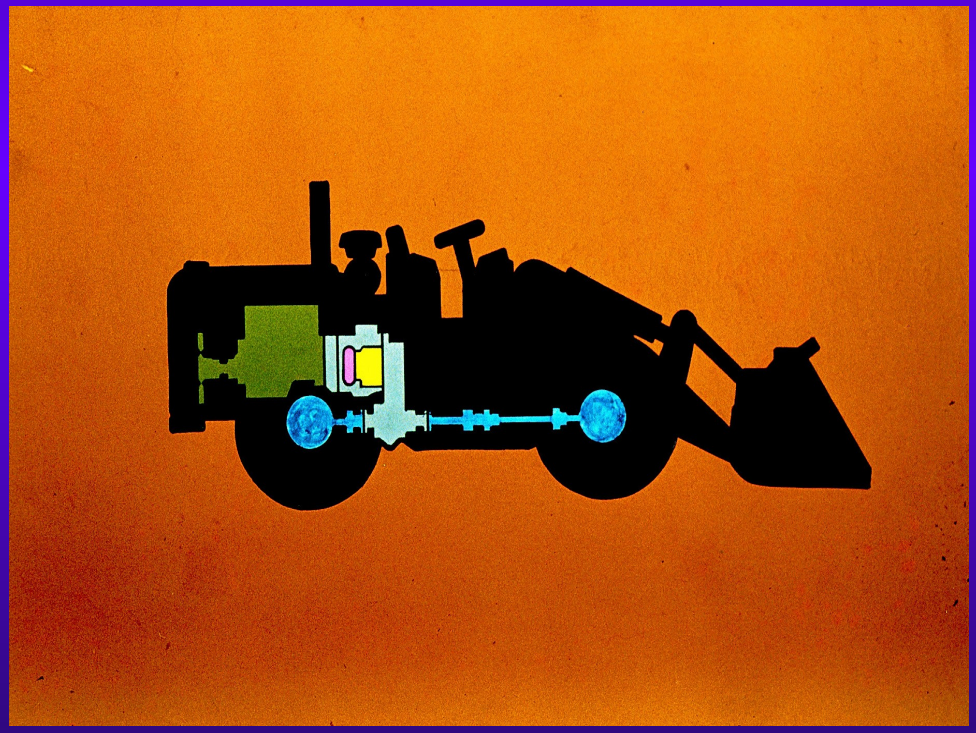
ENABLING LEARNING OBJECTIVE “A”

ACTION: Identify the fundamentals of power train systems, power shift transmission components, their functions, and test and adjustment points.

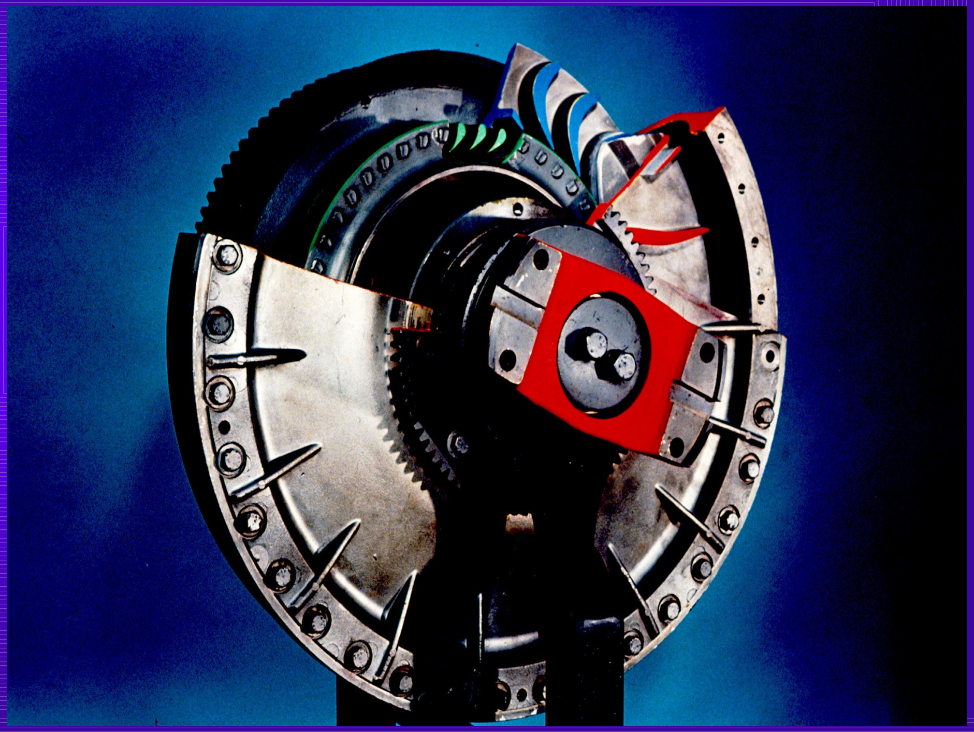
CONDITIONS: In a classroom and at a training site, given TM 9-214, TM 9-8000, TM 5-2410-237-20, TM 5-2410-237-34, TM 5-3805-248-14&P-2, TM 5-3805-261-20, TM 5-3805-261-34, TM 5-3805-262-20, TM 5-3805-262-34, TM 9-4910-571-12&P, a study guide, instruction on power train systems, items of construction equipment, training aids, a general mechanics tool box, special tools, TMDE, personal protective equipment (PPE), and a pen and pencil.

STANDARDS: Identify the fundamentals of power train systems, power shift transmission components, their functions, and test and adjustment points IAW TM 5-2410-237-20, TM 5-2410-237-34, TM 5-3805-248-14&P-2, TM 5-3805-261-20, TM 5-3805-261-34, TM 5-3805-262-20, TM 5-3805-262-34, TM 9-4910-571-12&P, and TM 9-8000. IAW TM 9-214 and TM 9-8000 without damage to equipment or injury to personnel.

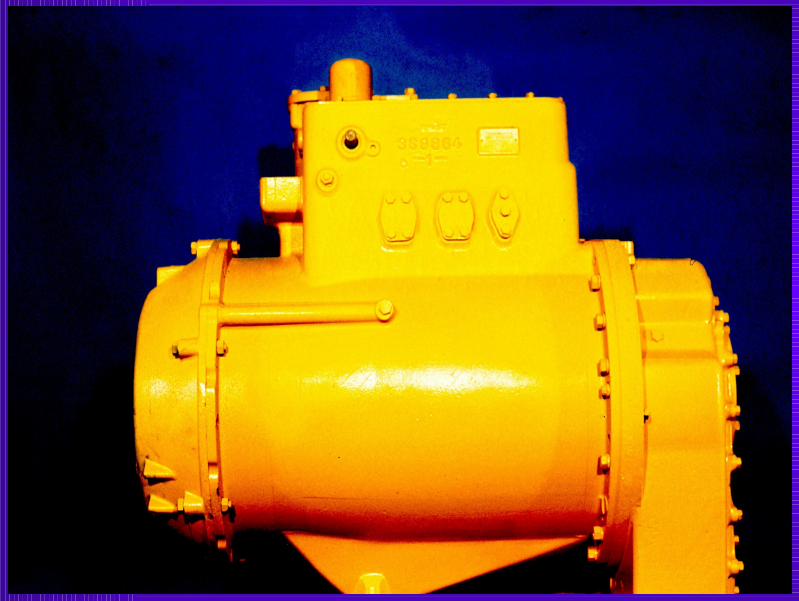
Fundamentals of Power train Components

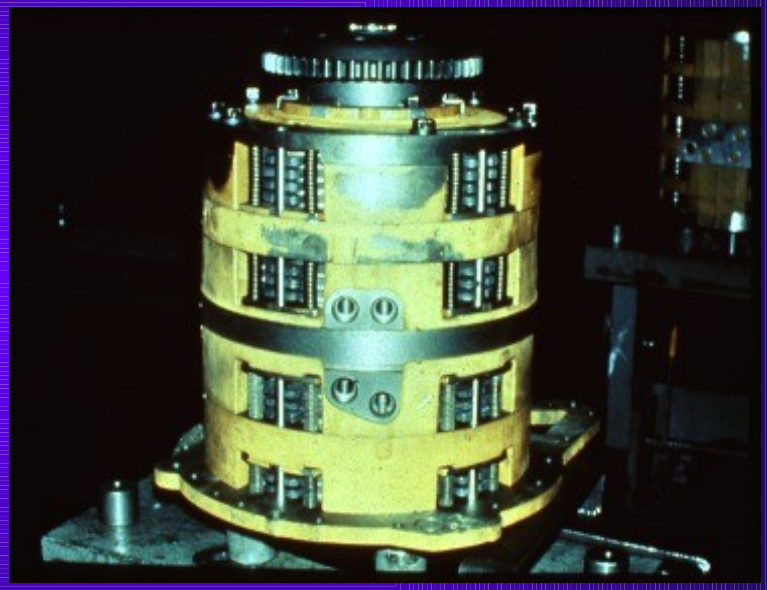


TORQUE CONVERTER

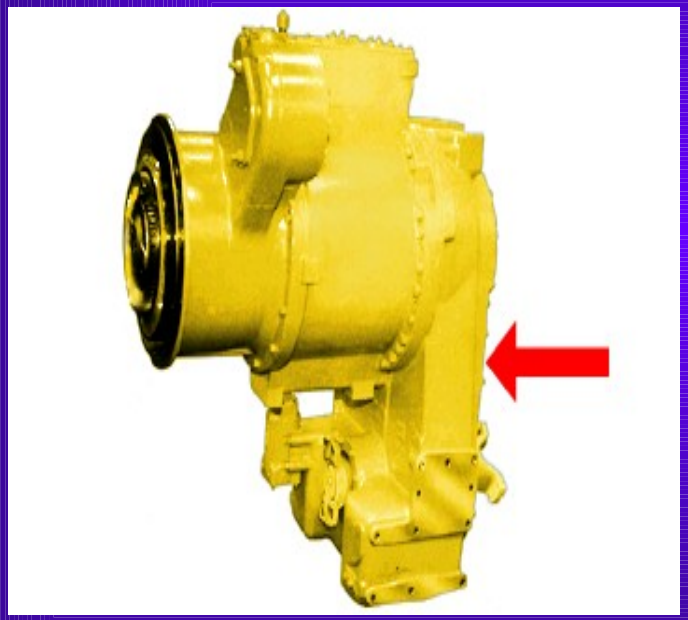


POWER SHIFT TRANSMISSION

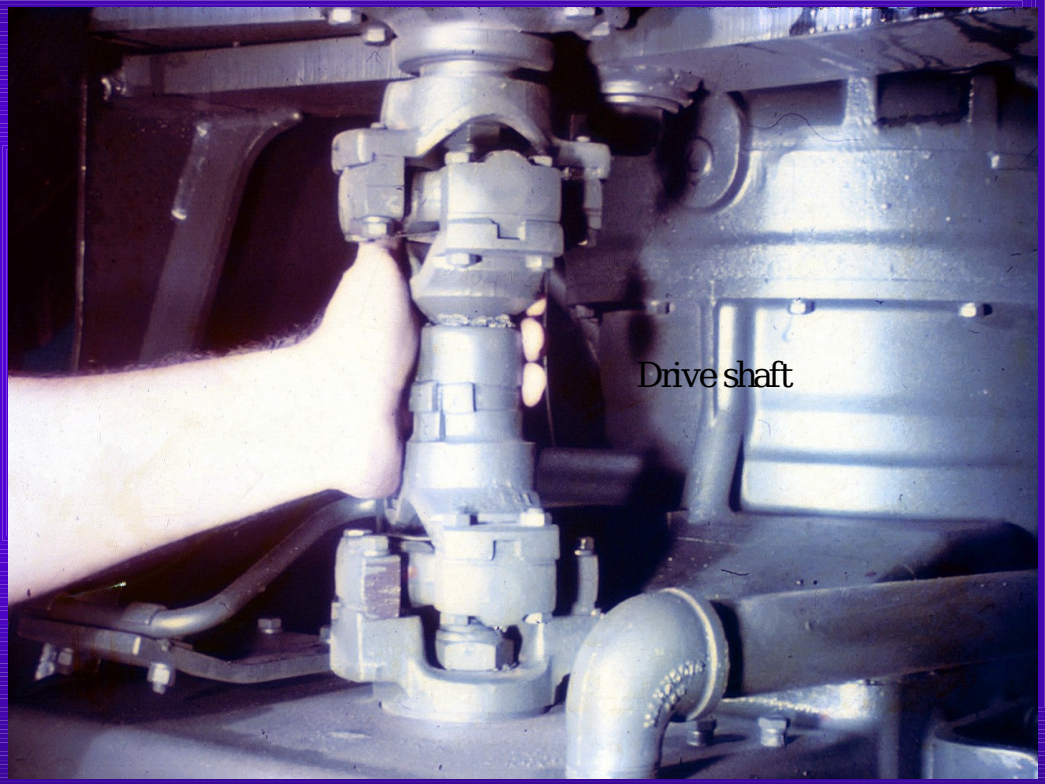




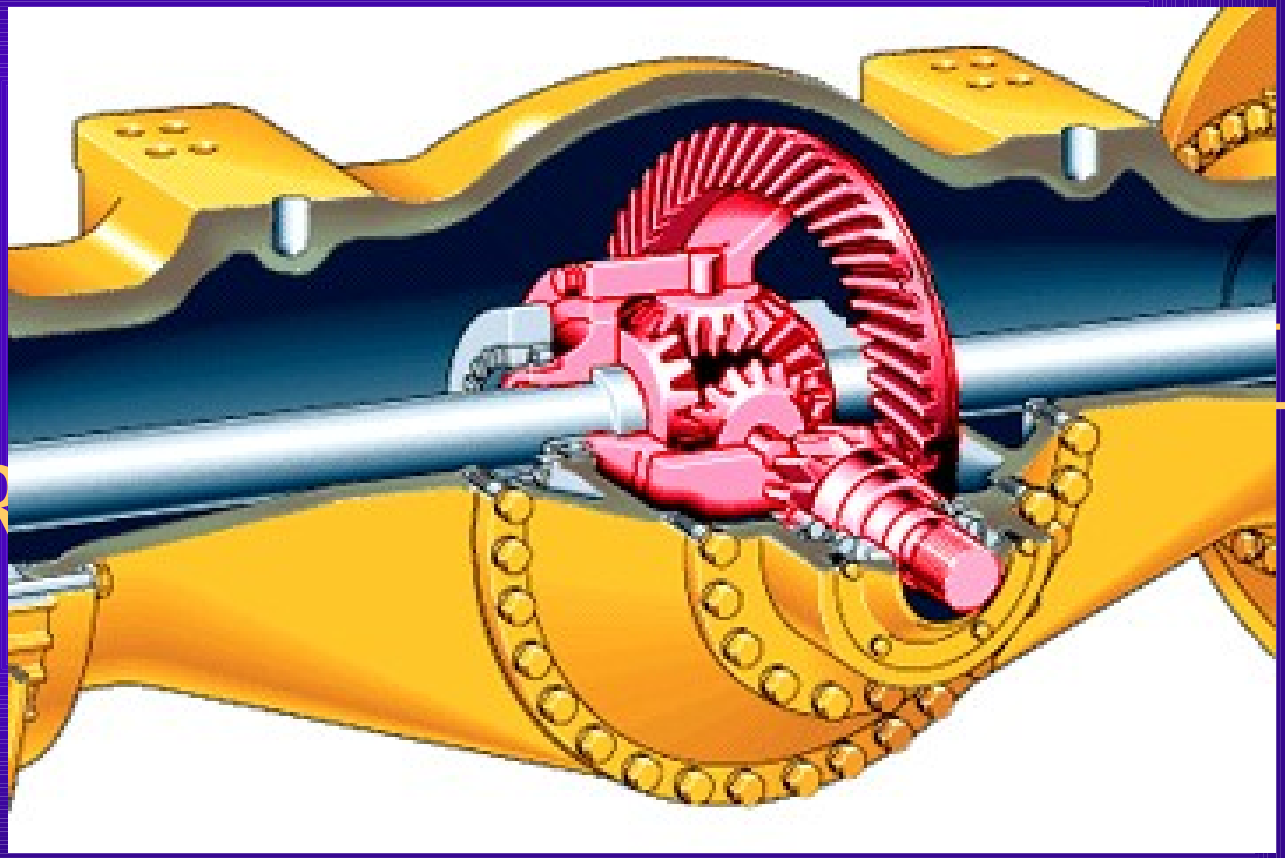
DROP BOX/ TRANSFER CASE,
TRANSFER GEARS



PROPELLER SHAFT, DRIVE SHAFT

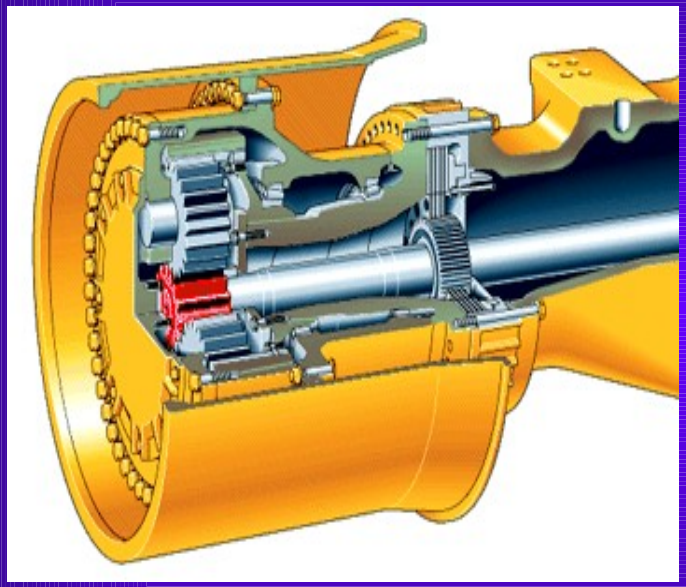


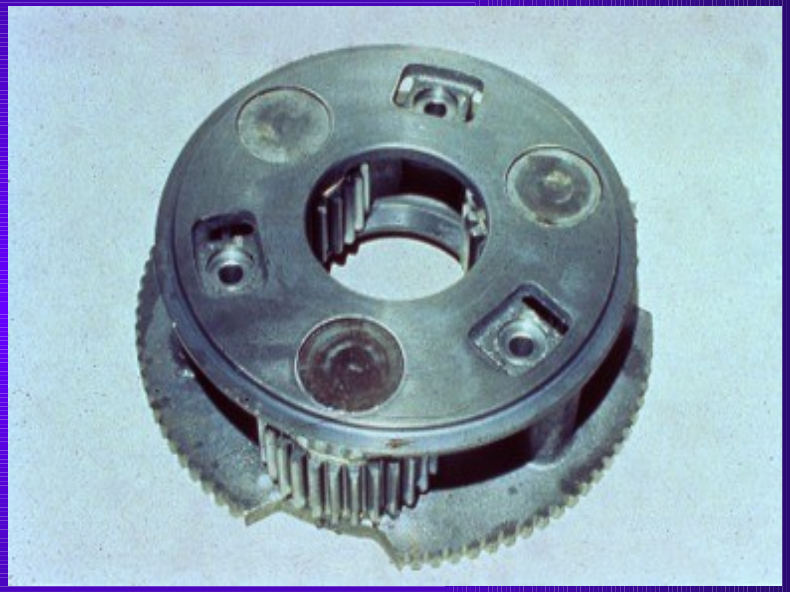
DIFFERENTIAL GROUP



GR LE

FINAL DRIVE PLANETARY GEARS





Gears

- Gears play an important part in the power train.
- Transmit rotary motion from one shaft to another.
- Parallel or at right angles

Splined Shaft

- Fastened to shaft.
- Grooves or Splines
- Gear cannot slip

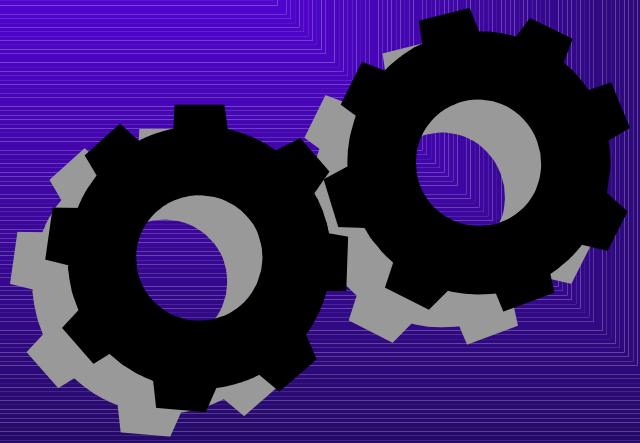
MECHANICAL ADVANTAGE

- Anytime you have a smaller gear driving a larger gear, you will have an increase in Torque.

- Anytime you have a larger gear driving a smaller gear, you will have an increase in speed.

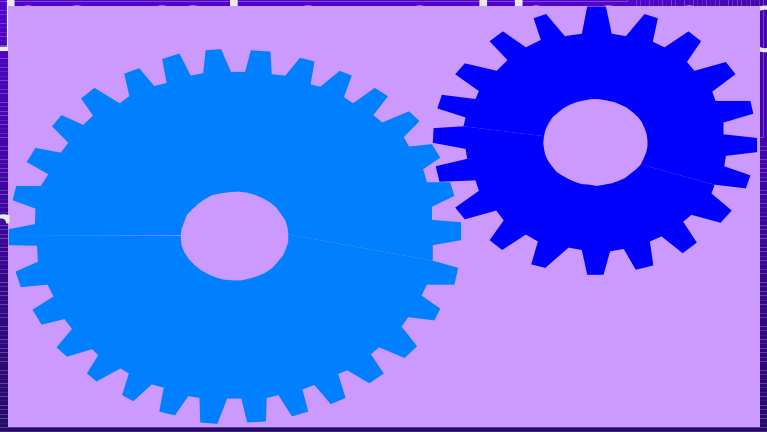
Gear Ratio

- Gear ratio is a measure of the changes in speed and torque.
- To determine gear ratio you must compare gear sets.
- What is this ratio?



Determining Gear Ratio

- Need to know, which one is the drive gear and which one is the driven gear, because you always record the drive gear first.
- What is th… …cture?



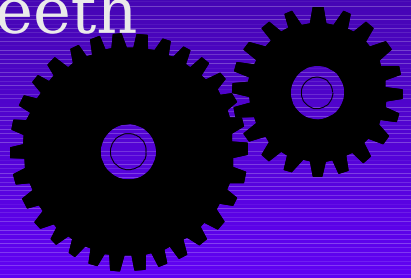
Driven Gea
12 teeth

Drive Gear
24 teeth

What Happens If the Teeth Number Is Odd?

Twenty Seven Teeth

Thirteen teeth



Driven Gear

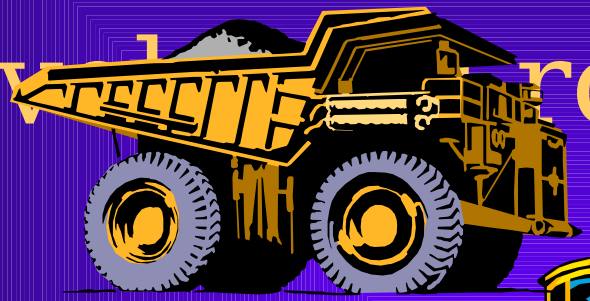
Drive Gear

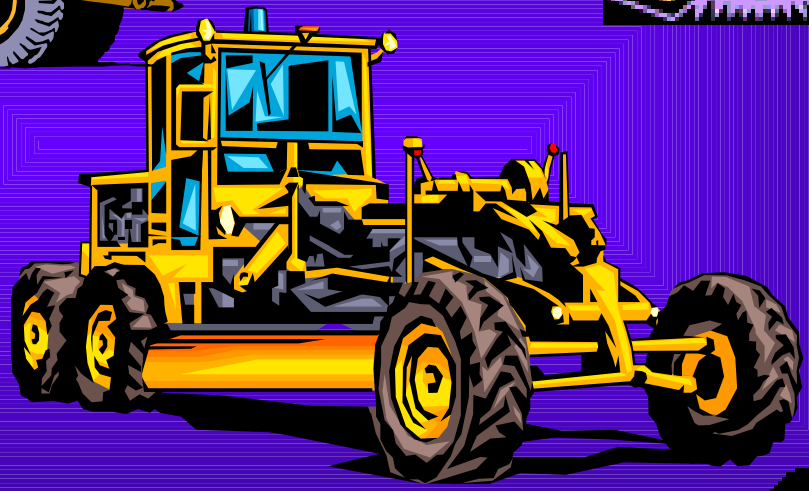
When the driving gear is larger than the driven gear, a _____ advantage is gained, but there is less _____.

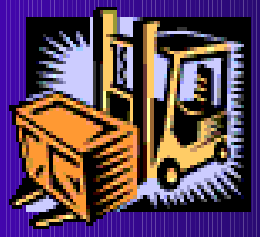
Gear Types

- Internal/External
- Spur
- Helical
- Bevel
- Worm

What component do we need to make these vehicles roll?







Bearings

- Two categories of bearings, Friction and Anti Friction.

- Bearings have four major jobs.
  - Reduce friction
  - Reduce wear
  - Support a rotating shaft
  - Provide a replaceable surface

Types of Bearings

- Ball
- Cylindrical Roller
- Tapered Roller
- Shaped Roller
- Needle Roller

Ball Bearings

- Support less weight than any-other bearing.
- Has less of a contact area than other be

Cylindrical roller bearings

- Support large amounts of weight.

Tapered Roller Bearings

- Most common bearing, used extensively in automotive power transmission systems.

Needle Bearings

- Associated, predominantly with the universal joint on the drive shaft.

Bearing Maintenance

- Dirty bearings must be thoroughly cleaned.

- Dry cleaning solvent, mineral spirits or paint thinner.

- Dry all bearings

Bearing Inspection

- Cracked bent or broken and scratches on
  bearings.
- Discoloration
- Improper lubrication is the main cause of bearing failure

Causes of Bearing Failure

- Lack Of Lubrication
- Contamination

Inner/Outer Race Failure

- Damage will be equally devastating, as you can see.
- Scheduled services should eliminate excessive damage.

How Do We Keep Dirt And Dust From Contaminating Bearings?

SEALS!

Seals are components that retain fluids.

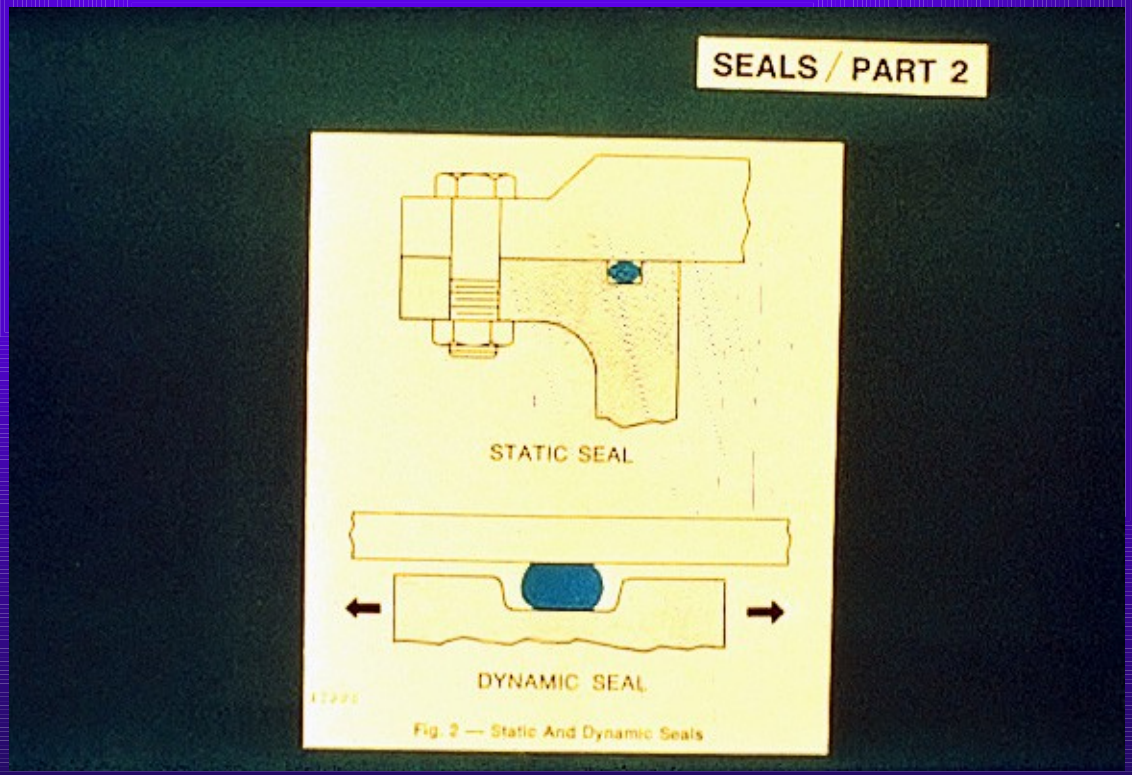
- Static Seal or Gaskets (stationary).
- Synthetic Rubber Seals, is the most common and can only operate effectively against fluid pressure from one direction.
- Dynamic Seal (Non Stationary).

Static Type Sealants

- You can brush them on
- You can tube them on
- You can spray them on

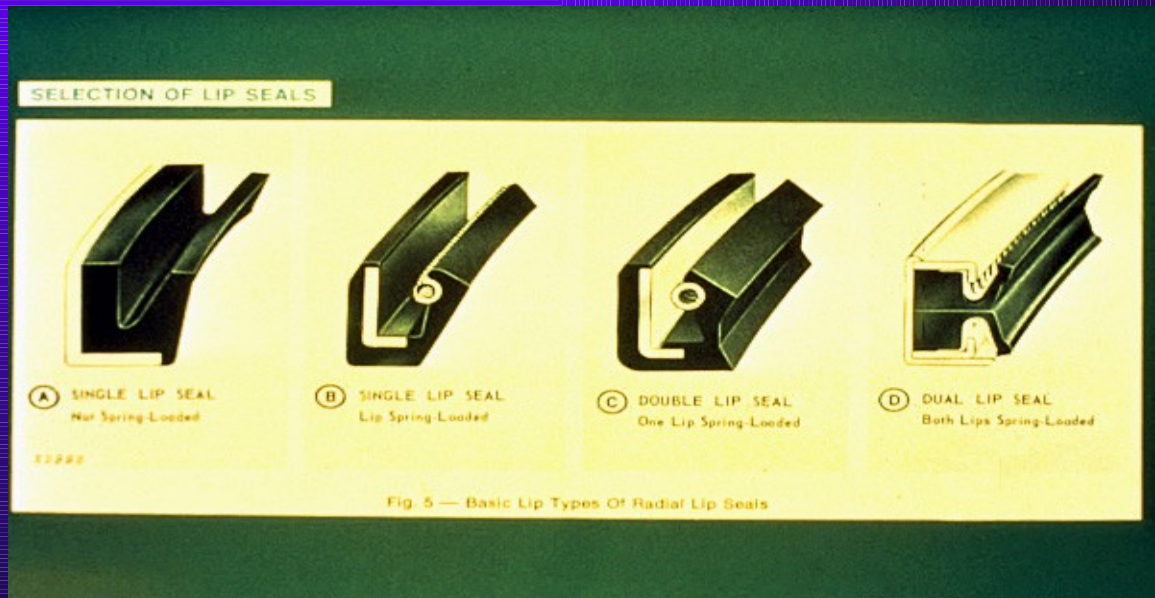
O-Ring

- Proper Installation
- Correct Size



Radial Lip Seal Types

- Single Lip
- Single Lip Spring Loaded
- Double Lip
- Double Lip Spring Loaded



Breakdown Of Radial Lip Seal

- Some Radial Lip Seals are made of Metal and Rubber.
- There are a few seals that are made of all rubber, depending on their application and position.
- Believe it or not, there are seals that are made exclusive of metal.

QUESTIONS!!

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